2010 Energy Report
City of Santa Barbara

June 2, 2011

Jim Dewey – Facilities and Energy Manager

2010 Energy Report

This year, the City of Santa Barbara Energy Team focused its efforts planning for three large projects. The first was finishing the design for the Energy Efficiency and Conservation Block Grant projects. The City received $868,000 from the U.S. Department of Energy as part of the American Recovery and Reinvestment Act. The project includes replacement of old, inefficient air conditioning systems with high efficiency systems equipped with electronic energy management controls.

The other two projects included a Fats, Oils and Grease (FOG) receiving station and an engine cogeneration facility to be installed at the El Estero Wastewater Treatment Plant. The FOG facility will allow the City to receive and inject “brown” grease collected from local restaurant grease interceptors into the anaerobic digesters at El Estero. This will generate additional methane to be used by the engine cogeneration facility to generate electricity and hot water for plant operations.

Electricity

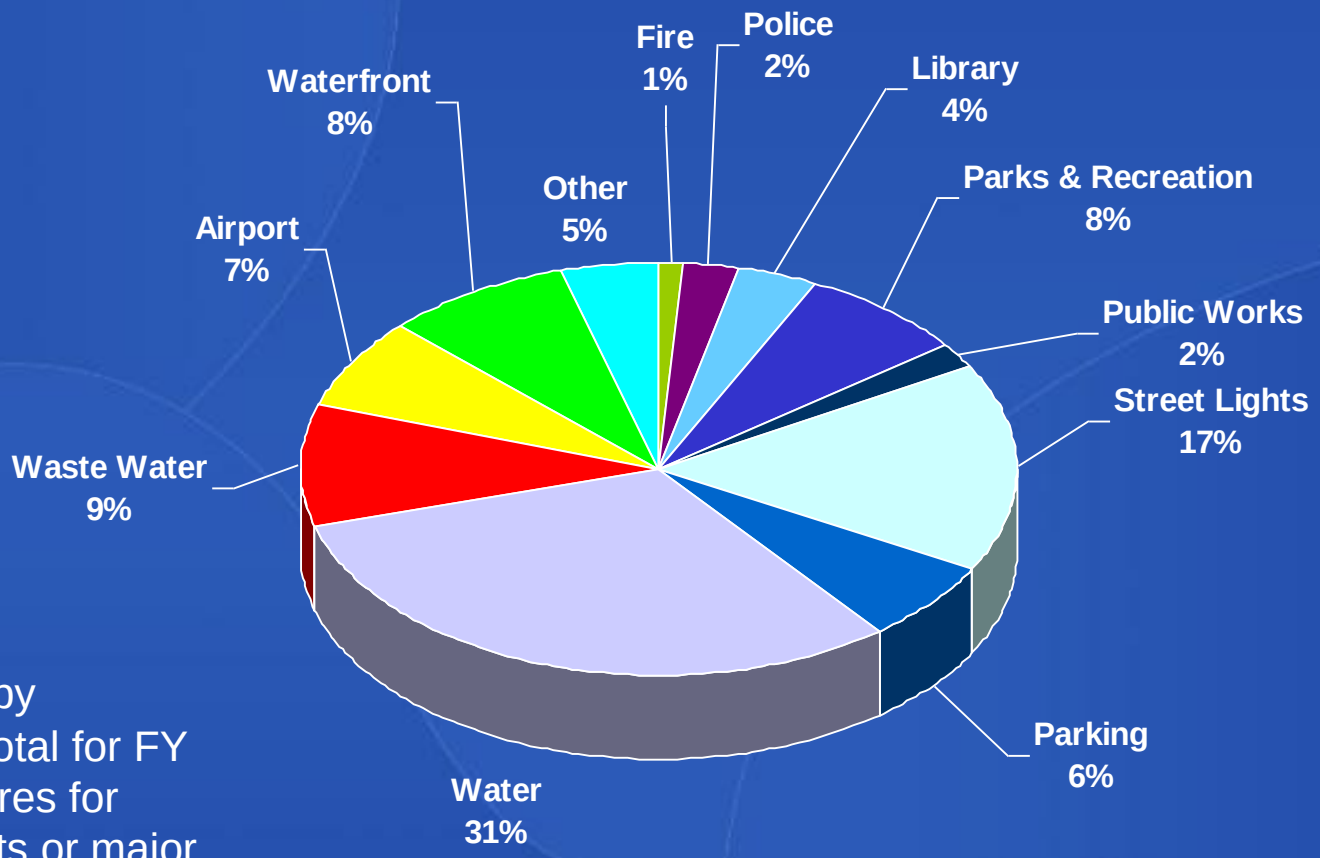
Electricity

In Fiscal Year 2010 (July 2009 through June 2010) the City spent $3.2 million on electricity. 40 percent of electrical use was for treatment of water and wastewater at the City's treatment facilities and pumping stations. Staff is planning to improve local water quality by installing ozone water treatment at the Cater Water Treatment Plant beginning in 2012. This will be a benefit to the community by improving drinking water quality, but will significantly increase energy use by the plant. This is a good example that community water conservation not only saves water, but saves significant embodied energy used to treat and deliver water too!

Street lighting also uses a large amount of electricity. The demand for more neighborhood lighting is always growing, and the City is looking to new technologies, like light emitting diodes, to provide efficient street lighting in the future.

The following chart shows the breakdown of electrical expenses for City operations by major use area.

FY 2010 Electricity Expense



Electricity cost by percentage of total for FY 2010 expenditures for City departments or major use areas

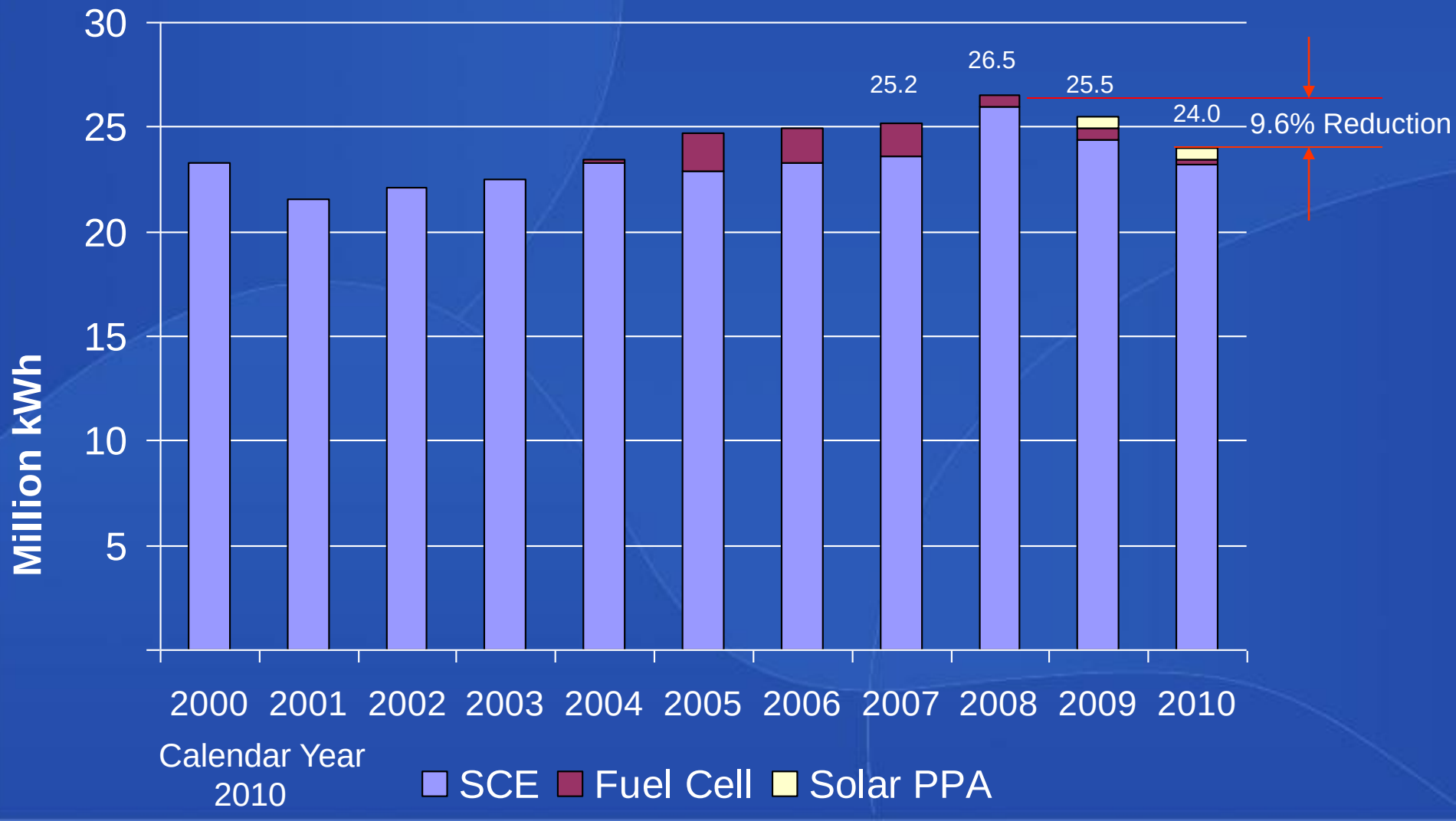
Total $3,217,000

Purchased Electricity

- The City's Energy Team has been working diligently to reduce energy consumption in City facilities since 2008. The following chart shows the energy consumption for City operations over time for all sources of purchased electricity. The efforts of the energy team has reduced electricity consumption for City operations by almost 10% since 2008.

Purchased Electricity

Annual Purchased Electricity Use



Biggest Electrical Users

The following table shows the electricity use for the five largest City accounts. Water treatment and street lighting are both large electricity users, and their energy use is growing due to demand by the community.

The energy team is strategizing on ways to provide for increasing demand for service, while reducing energy use through the use of new technologies and other energy saving strategies including the use of electronic energy management systems.

Biggest Electricity Users

SCE Account	kWh
El Estero Wastewater Treatment Plant	6,400,859
Cater Water Treatment Plant	2,366,264
Marina 1	944,766
Street Lighting Ornamental Downtown	804,023
Police Station	627,360

Single largest SCE electricity accounts for 2010. Staff is actively pursuing energy conservation measures for all large accounts

Natural Gas

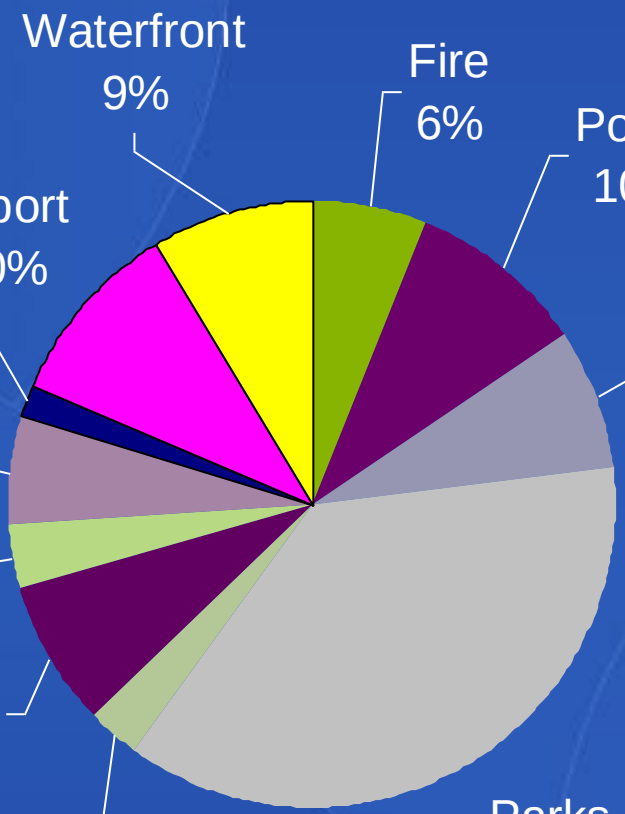
Natural Gas

Natural gas represents only 5% of the City's purchased energy costs. The following pie chart shows the FY 2010 natural gas expenditures by major use area.

The City spent $163,000 on natural gas in FY 2010. We plan to reduce natural gas use by replacing older furnaces and boilers with new, energy efficient systems.

FY 2010 Natural Gas Expenditures

$163,186 Total



Pool heating represents the largest single use of natural gas for the City as a whole, and for the Parks and Recreation Department

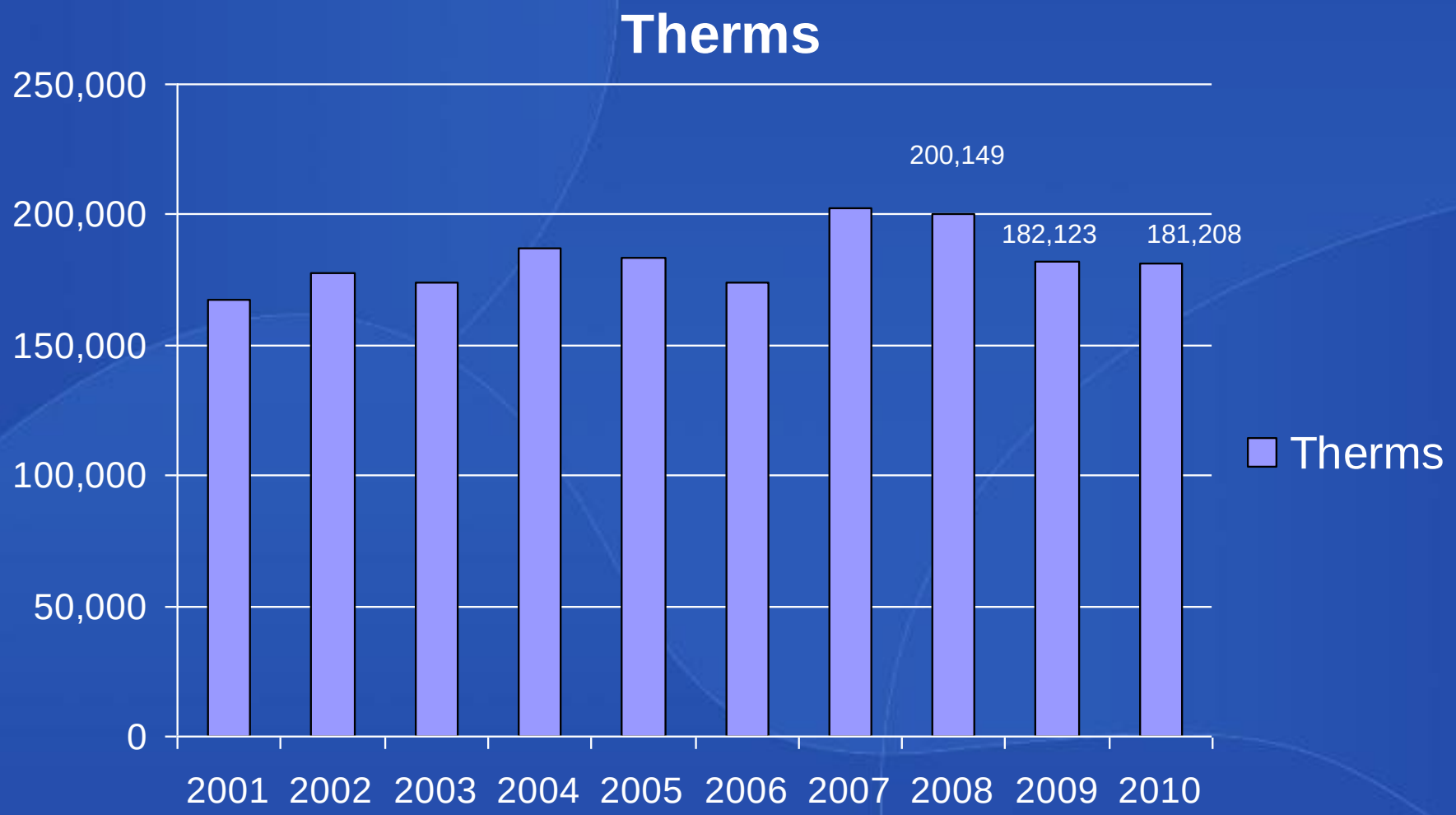
Natural Gas Use by Year

Natural gas usage for City operations has remained fairly flat during the last 10 years.

To reduce the substantial natural gas use at the Los Baños Del Mar pool, City staff is planning to replace the pool boilers with high efficiency condensing boilers in FY 2012.

The following chart shows the natural gas usage by year since 2001.

Natural Gas Use by Year



City wide annual natural gas use

Largest Natural Gas Users

The greatest single use of natural gas for the City is for heating swimming pools. The rest of the natural gas consumption is primarily used to heat buildings.

The City's energy team is reducing energy use in buildings with the installation of electronic building controls that maximize heating efficiency, while minimizing operating hours.

Largest Natural Gas Users

Account	2010 Therms
Los Baños Pool	50,650
625 Laguna (Public Works)	15,167
Police Station	13,020
Cabrillo Pavilion	11,881
El Estero Wastewater Treatment Plant	9,686

This chart shows the largest single Southern California Gas Company accounts. Facilities is planning to install new high-efficiency boilers at the Los Baños pool in FY 2012.

Renewable Energy

Renewable Energy

Renewable energy represents a substantial and growing part of the City's electricity supply. Currently, renewable energy sources make up 23% of all the City's electricity use.

Renewable energy sources include photovoltaic generation, renewable methane cogeneration and Southern California Edison renewable sources.

Photovoltaic Generation

The City has two large photovoltaic (PV) generation facilities. The first—a 300 kW plant, located in the Public Works Corporate Yard was installed in December 2008, and supplies 87% of the electricity used for the Public Works facility.

The second plant is located at the Airport's "Quick Turn Around" rental car maintenance facility, and provides more than 100% of the facility's electrical needs. The excess generation is sold to Southern California Edison.

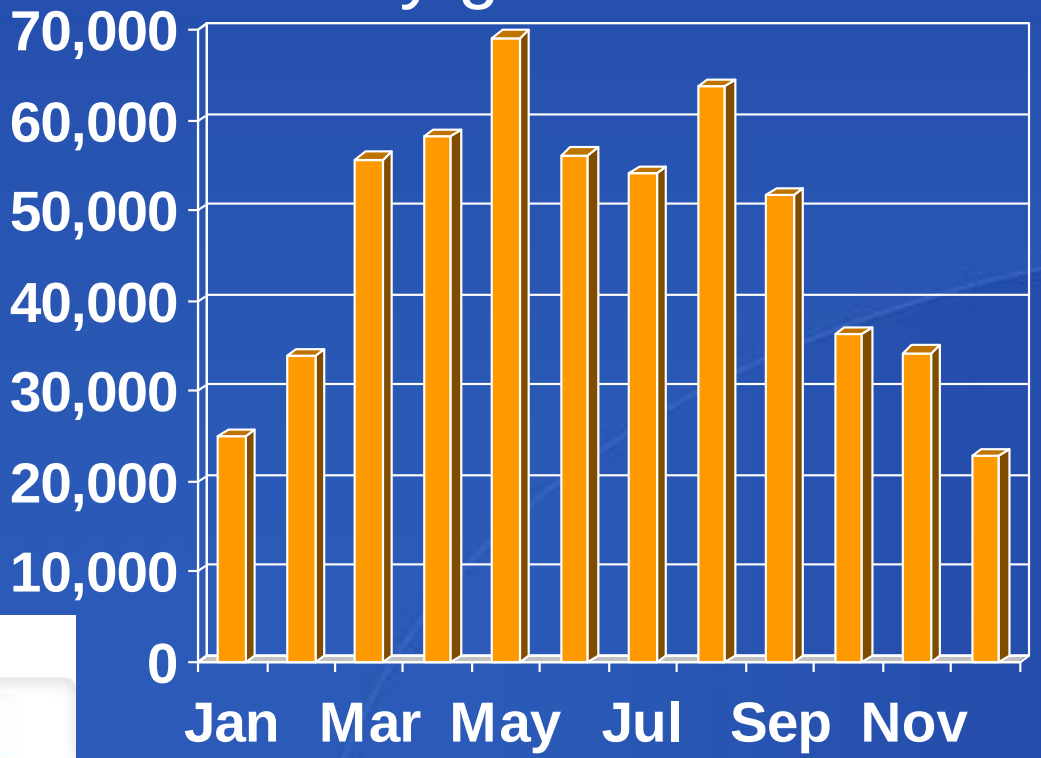
The following charts show the monthly production (and demand for the QTA facility) for both PV facilities.

2010 Corporate Yard Power Production

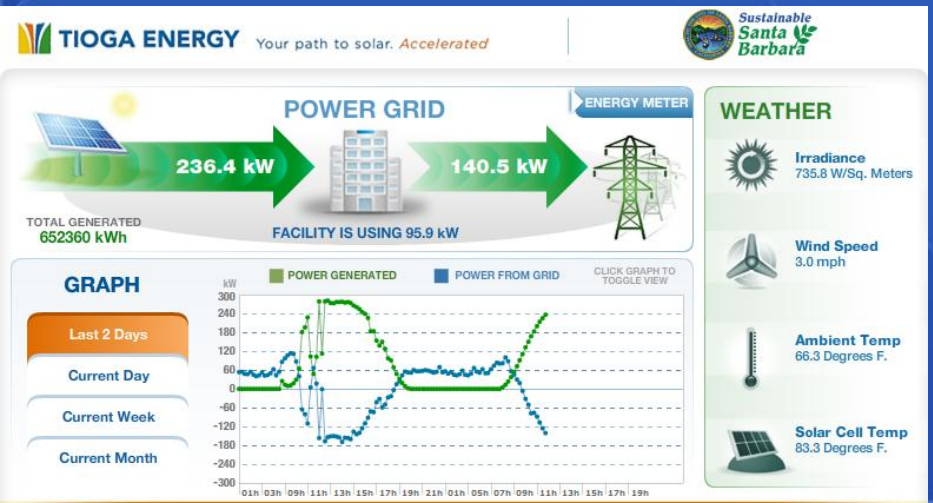
561,171 kWh
2010 Total

kWh

Monthly generation 2010



Web based monitoring system



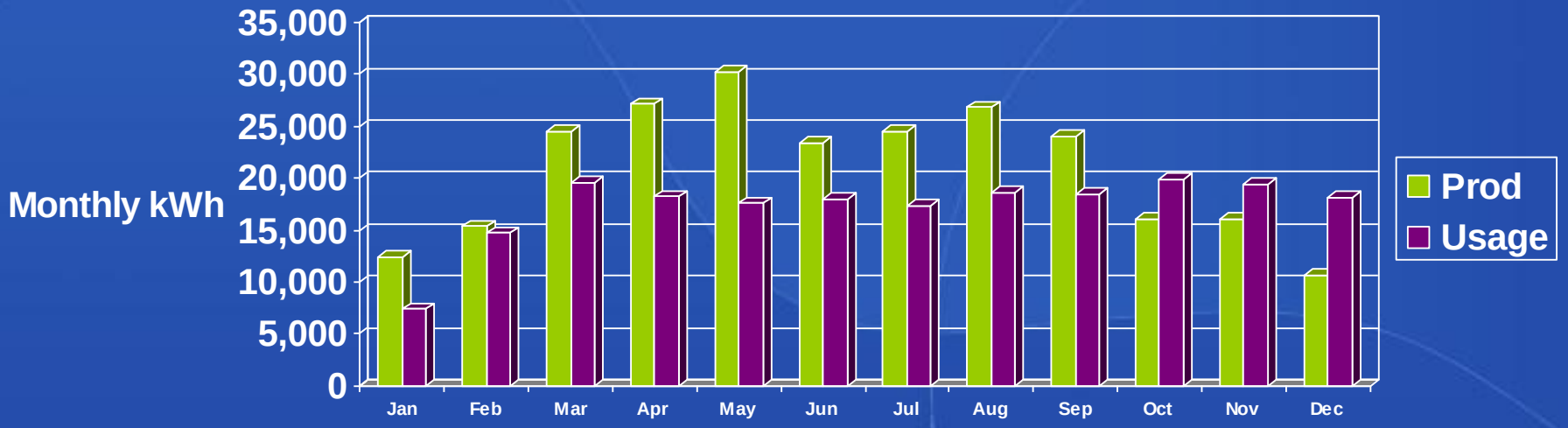
The Corporate Yard PV system is exceeding expectations for total generation. The system provides 87% of the electrical needs for the Garden Street and Laguna Street Complexes

Airport QTA PV System

The QTA Facility solar photovoltaic generation system provides 100% of the electrical power use at the facility

2010 PV Production and Electrical Usage

2010 Total - 251,221 kWh



Solar Photovoltaic Projects

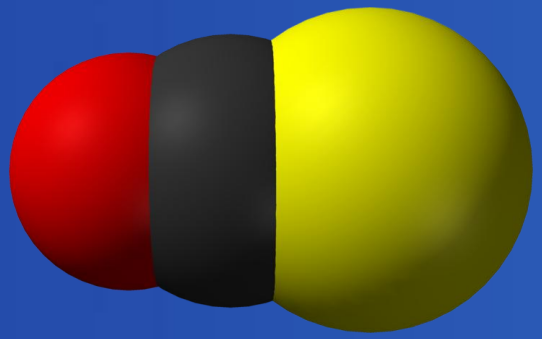
Project	kW (Size)	Annual kWh
PW Corporate Yard PV	302	551,808
Airport QTA PV	190	300,000
Fire Station 2 PV	15	24,000
Fire Station 1 PV	10.2	16,000

This table shows the annual solar generation and system size for all City solar photovoltaic generation projects. These systems provide a total annual generation of 890,000 kWh. This is enough energy to power 150 local area homes.

El Estero Methane Generation

- The El Estero Wastewater Treatment Plant produces enough methane to generate most of the plant's electrical and heating needs. A fuel cell, installed in 2005, provided electrical generation and waste heat using methane as fuel.
- The fuel cells became unreliable due to problems caused by a sulfur component in the gas supply. Several attempts to fix the problem failed, and staff decided to remove the fuel cells in December 2010 to make room for engine cogeneration.

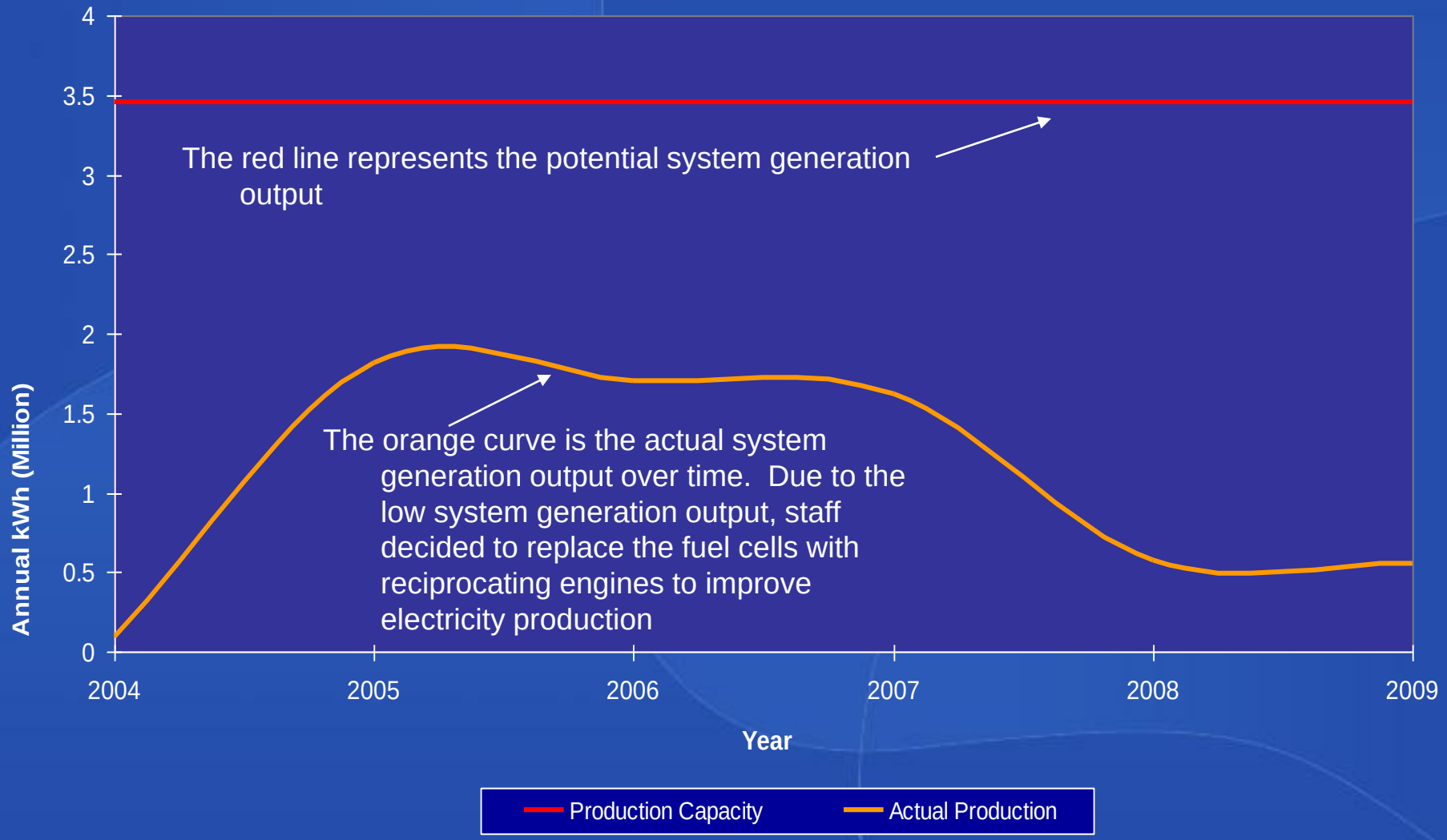
El Estero Wastewater Treatment Plant
Fuel Cell Generation



Carbonyl Sulfide in the digester gas supply kept the fuel cells from running optimally.

Fuel Cells generated electricity and hot water for El Estero operations using digester gas for fuel. The fuel cell cogeneration system was operated under a Power Purchase Agreement (PPA) where a third party finances and operates the facility, and required no capital investment by the City.

Fuel Cell Power Production



Fuel Cell Removal

On December 9, 2010 the fuel cells were removed to make room for engine cogeneration

I.C. Engine Generation at El Estero

700 kW Guascor Generator

Staff has selected Engine Cogeneration to replace the Fuel Cell system. The system is capable of producing most of the electrical and heating needs for the El Estero plant, and is funded through a Power Purchase Agreement

I.C. Engine Generation
El Estero

- California Power Partners (CalPWR) was selected as the City's Power Purchase Partner to develop the engine cogeneration project
  - CalPWR will provide all capital funding and provide a "turn-key" cogeneration facility
  - City will purchase all electricity produced by the system at 8.49 cents per kWh for 10 years
  - City will receive all waste heat produced by the system for free
  - City will save an average of $60K/Year on electricity

calpwr

2010 Renewable Electricity Totals

- Southern California Edison delivers about 19.4% renewable energy in their power mix.
- Total of SCE and City renewable generation sources:

23% Renewable Electricity

Energy Conservation

When the Energy Team designs energy conservation projects, we try to maximize:

- Energy Savings
- Operational Savings
- Maintenance Savings
- Deferred Maintenance Reduction – targeting building systems that need to be replaced due to age

Energy Conservation Success Story

The filter pumps at the Los Baños del Mar pool needed to be refurbished. These 30 horsepower pumps run continuously—day and night. The energy team worked with the pool staff to rebuild the pumps and replace the pump motors with high efficiency motors. The Team also installed variable frequency drives and controls that allowed the pumps to run at a lower speed at night when the pool is not being used.

Success Story
Los Baños Del Mar Pool Variable Speed Pumping

- $15,500 annual savings
- $22,882 Work Force Housing Grant
- $11,620 SCE Rebate
- Net Cost $2,700
- Payback – 2 months
- Replaced old equipment
  - Provided System Renewal

Success Story
Los Baños Del Mar Pool Variable Speed Pumping

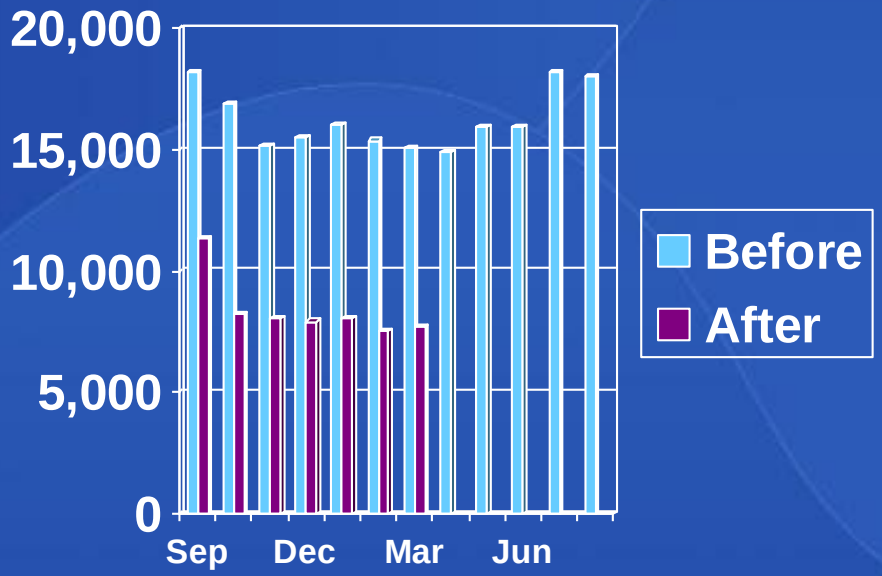
The project was able to reduce the total electricity usage for the whole facility by half, and cut the energy bill by more than half. The following charts show the actual SCE energy bill data for energy usage (kWh) and cost before and after the project was installed (mid-September 2010)

Success Story

Los Baños Project Savings

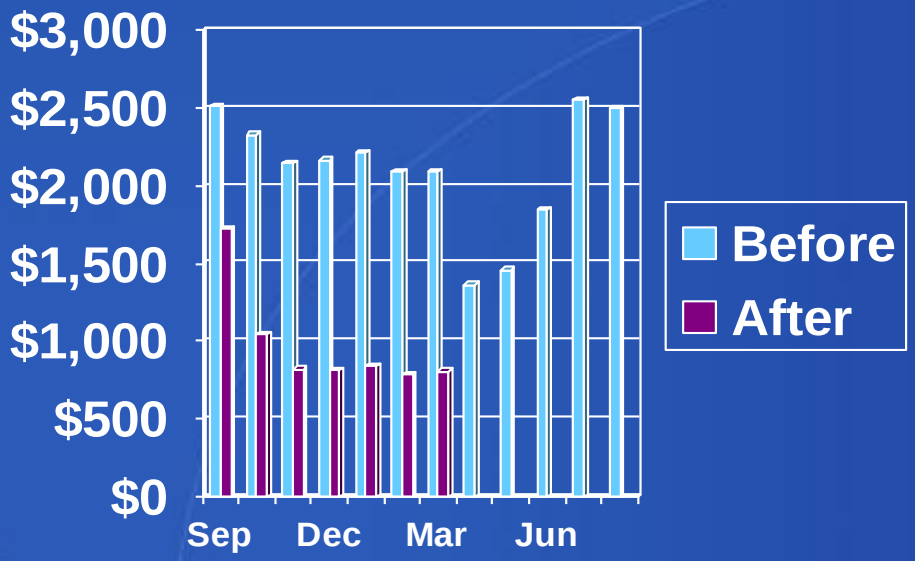
Project completed September 2010

Los Baños Monthly Electrical (kWh)



Annual kWh Savings – 100,000

Los Baños Monthly Electrical Cost



Annual Savings - $15,500

Tariff Change Savings

Another money saving endeavor provided by the Energy Team is lowering the commodity cost of energy by auditing energy bills to see if an electricity or natural gas account can benefit from switching to a new tariff. Tariffs are regulated by the California Public Utilities Commission, and have strict requirements on how energy can be used at a facility to conform with the requirements of a given tariff.

Sometimes, there are opportunities to save money by switching to a new tariff. The energy team continuously analyzes tariffs and usage data for opportunities to gain this type of savings.

Energy Team Activity

Tariff Change Savings

- Audited major electrical service accounts
- Annual estimated savings since 2008
  - $ 109,600 per year

Tariff Change Savings Success Story

An excellent example of Tariff Change Savings is switching from a General Service tariff to an All Night Lighting tariff at the Pershing Park Field.

Pershing Park uses most of its electricity at night for sport lighting. Switching from a GS-2 to an AL-2-A (all night lighting) saved over $27,000 per year for the Parks and Recreation Department

Success Story

Tariff Change Savings

Pershing Park Tariff Change

- Switched from GS-2 to AL-2-A tariff (June ‘10)
- SCE Bills
  - Previous 12 months - $34,759
  - Last 12 months - $7,367
- Annual Savings - $27,287

Energy Team Savings

The efforts of the Energy Team have resulted in significant cost savings for the City. Since the Team became active in 2008, we have achieved an ongoing annual savings of $350,000 from energy conservation and tariff changes.

The Team also applies for and receives grants and rebates. The following page shows the one-time grant and rebate funding and cumulative annual savings for the City's energy program

Energy Team Savings

One Time Savings 2010

- Rebates – $ 11,620
- Grants - $22,822

Ongoing Annual Savings*

- Annual Conservation Savings – $ 240,000
- Annual Electrical Rate Savings – $ 109,600

Total- $ 349,600

* From actions taken 2008 through 2010

Future Energy Projects

During fiscal year 2012, The Energy Team plans to complete the rest of our Energy Efficiency and Conservation Block Grant projects and will receive a grant of $360,000 from Southern California Edison to implement an enterprise energy information system that will monitor the City's energy use for operations in real-time. This system will help us to plan future conservation and renewable generation projects.

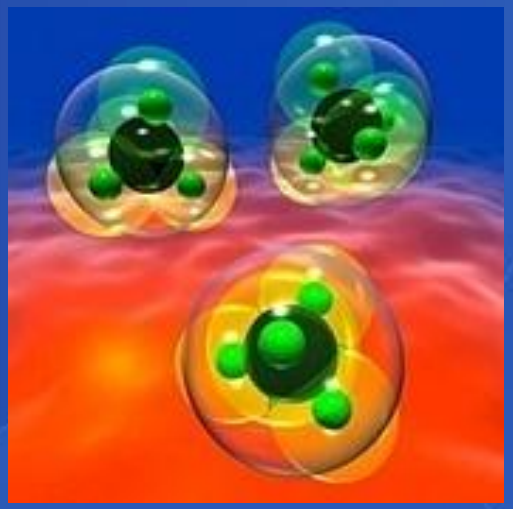
We will also be completing our Fats, Oils and Grease (FOG) receiving station and our engine cogeneration facility at the El Estero Wastewater Treatment Plant. The FOG project will allow El Estero to receive "brown" grease from local restaurant grease interceptors and inject that material into the waste treatment process—generating more methane to be used by the cogeneration facility to generate electricity and heat for plant operations.

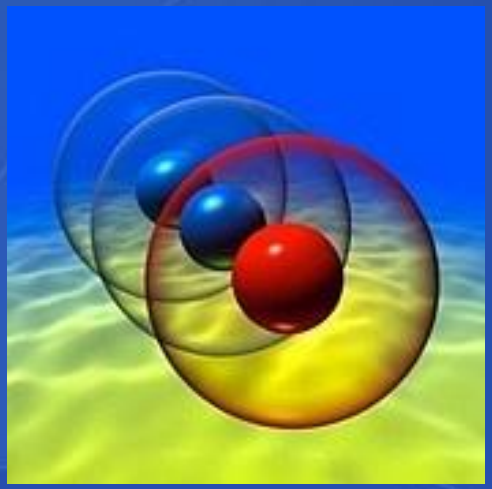
Future Energy Conservation Projects

Highlights for FY 2012:

- SCE Grant – California Strategic Energy Plan
  - $360,000 Grant
  - Implements an Enterprise Energy Information System
  - Provides Real-Time energy data for all our large facilities
- EECBG
  - $818,200 Grant
  - Saves 526,000 kWh and $81,000 annually
  - HVAC and sports lighting improvements
  - Projects completed by September 12, 2012
- Completion of FOG Pilot and Construction of Digester Gas Methane Generation (Power Purchase Agreement) at El Estero

Greenhouse Gas Emissions



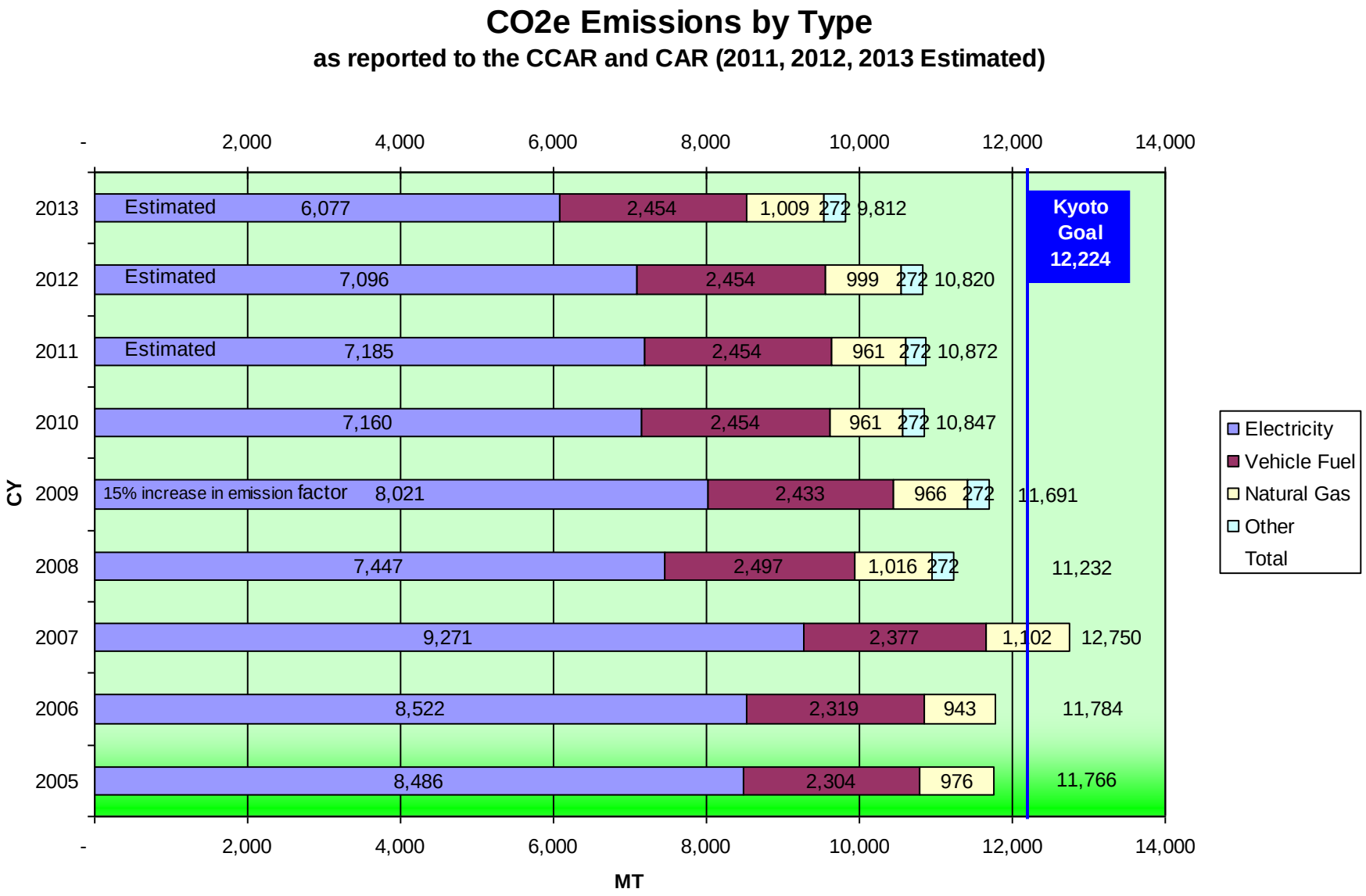


Greenhouse Gas Emissions

The City's greenhouse gas emissions for operations from all sources, including transportation, energy use and other sources; are decreasing due to conservation and efficiency. Calendar year 2010's emissions in Carbon Dioxide Equivalents (CO_2e) is 10,847 metric tons—well below our Kyoto target of 12,224 metric tons.

The following chart shows actual and projected CO_2e since 2005.

CO_2e Emissions from City Operations



Acknowledgements

The Energy Team's success this year is the result of the hard work of City staff, and the support of the City Council and the Community. Our aim is to serve as an example by implementing projects the save energy and money, using strategies that others can duplicate.

During these difficult economic conditions, energy conservation is a great opportunity to save money and preserve natural resources.

Thanks to you for supporting our efforts to conserve energy and save money.

City of Santa Barbara Energy Team

Alelia Parenteau
Jeff McKee
Victor Garza
Dion Tait
Karl Treiberg
Lori Pedersen
Bill Ferguson
Todd Heldoorn
Nina Johnson
Jim Dewey
Thomas Welche